

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

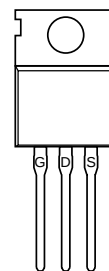
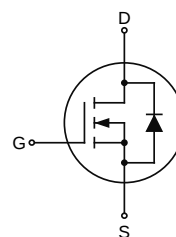
- Spilt Gate Trench Technology
- Excellent $R_{DS(ON)}$
- Low gate charge

1.2 Applications

- DC-DC Converter
- Load Switch for Portable Device
- Battery Switch
- Rectifier

1.3 Quick reference

- $BV \geq 100V$
- $I_D \leq 120A$
- $R_{DS(ON)} \leq 5.4m\Omega @ V_{GS} = 10V$ (Type:4.5m Ω)



Top View
TO-220

2. Package Marking and Ordering Information

Product Name	Package	Marking	Reel Size	Tape width	Quantity
KJ053N10C	TO-220	053N10 YWWXXX YWWXXX: Date Code	-	-	1000

3. Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current $V_{GS} @ 10V$	120	A
$I_D @ T_A=100^\circ C$	Continuous Drain Current $V_{GS} @ 10V$	84	A
I_{DM}	Pulsed Drain Current ¹	440	A
E_{AS}	Single Pulse Avalanche Energy ²	225	mJ
P_D	Power Dissipation	192	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	$-55 \sim 150$	$^\circ C$
$R_{\theta JC}$	Thermal Resistance Junction-Case	0.65	$^\circ C/W$

4. Electrical Characteristics (T_A=25°C unless otherwise specified)

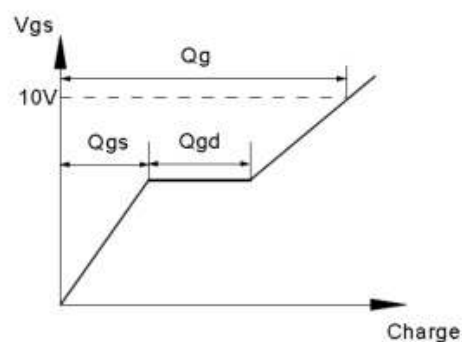
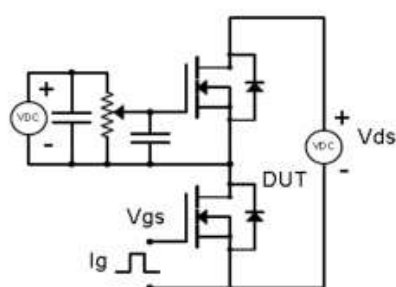
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	100	-	-	V
V _{GS(th)}	Gate Threshold Voltage ³	V _{DS} =V _{GS} , I _{DS} =250μA	2.0	3.0	4.0	V
I _{DSS}	Zero Gate Voltage Source Current	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)}	Drain-Source On-State Resistance ₃	V _{GS} =10V, I _D =20A	-	4.5	5.4	mΩ
R _G	Gate Resistance	Frequency=1.0MHz	-	3.5	-	Ω
Dynamic Characteristics						
C _{iSS}	Input Capacitance	V _{GS} =0V, V _{DS} =50V Frequency=1MHz	-	3244	-	pF
C _{oSS}	Output Capacitance		-	1075	-	
C _{rSS}	Reverse Transfer Capacitance		-	52	-	
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =50V, R _L =2.5Ω V _{GS} =10V, R _G =6Ω	-	22	-	ns
t _r	Turn-on Rise Time		-	36	-	
t _{d(off)}	Turn-off Delay Time		-	49	-	
t _f	Turn-off Fall Time		-	31	-	
Q _g	Total Gate Charge	V _{DS} =50V, I _{DS} =20A V _{GS} =10V	-	51	-	nC
Q _{gs}	Gate-Source Charge		-	15	-	
Q _{gd}	Gate-Drain Charge		-	13	-	
Source-Drain Diode Characteristics						
V _{DS}	Diode Forward Voltage ³	V _{GS} =0V, I _S =20A	-	-	1.2	V
I _S	Diode Forward Current ⁴		-	-	120	A
t _{rr}	Reverse Recovery Time	I _S =15A, V _{GS} =0V dI _F /dt=100A/μs	-	58	-	ns
Q _{rr}	Reverse Recovery Charge		-	90	-	nC

Notes:

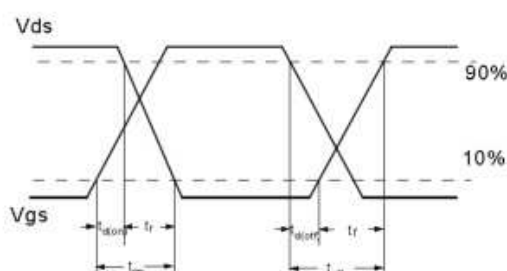
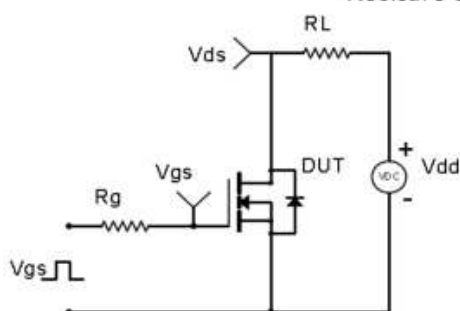
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. E_{AS} condition: T_J=25°C, V_{DD}=50V, R_G=25Ω, L=0.5mH
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
4. Surface Mounted on FR-4 Board, t ≤ 10 sec

5. Test Circuit & Waveform

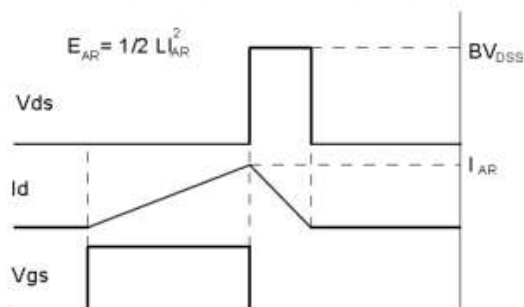
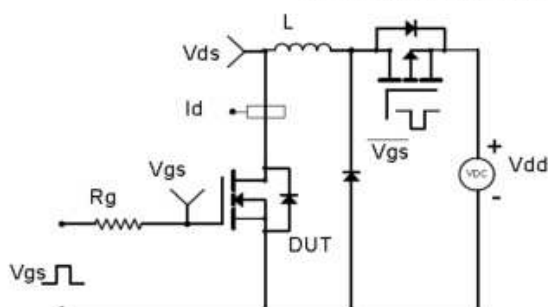
Gate Charge Test Circuit & Waveform



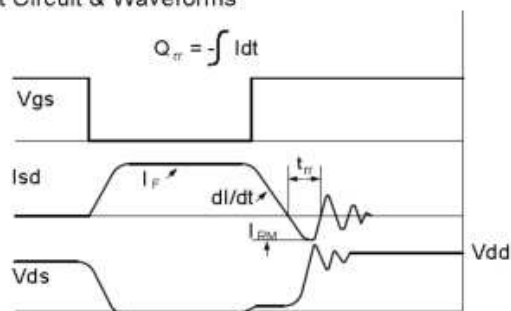
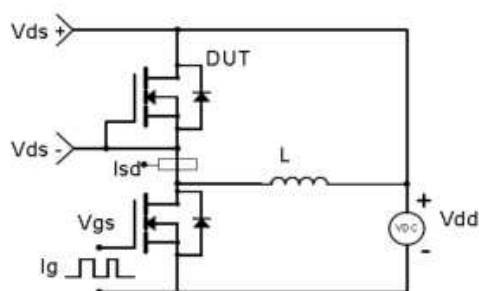
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



6. Typical Characteristics

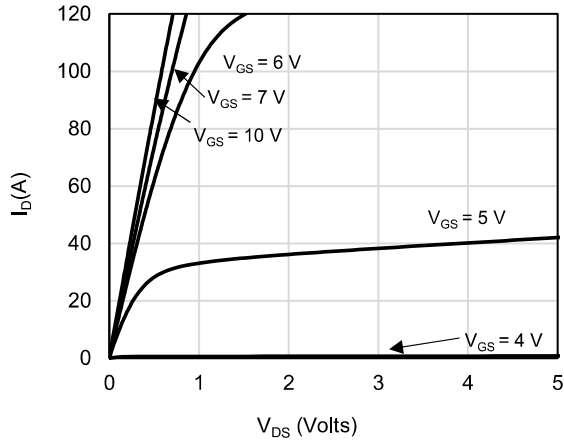


Figure 1: On-Region Characteristics

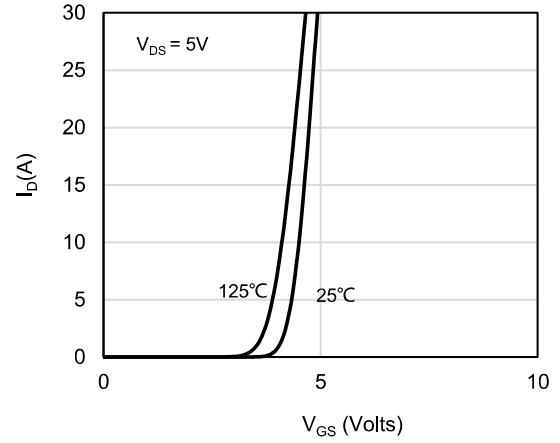


Figure 2: Transfer Characteristics

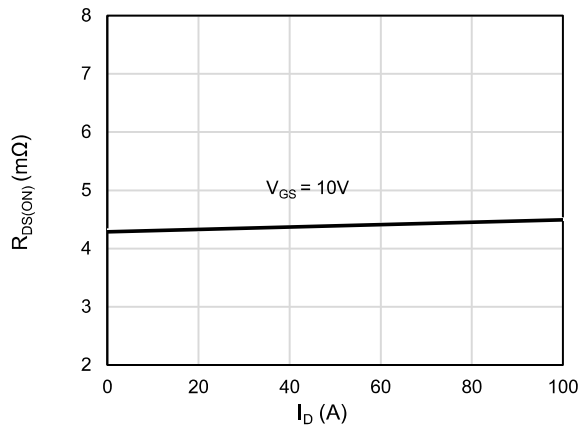


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

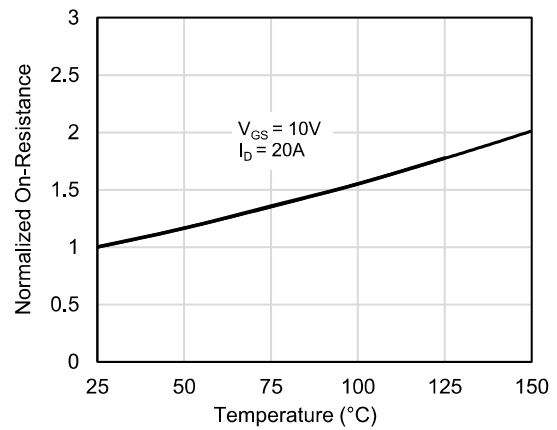


Figure 4: On-Resistance vs. Junction Temperature

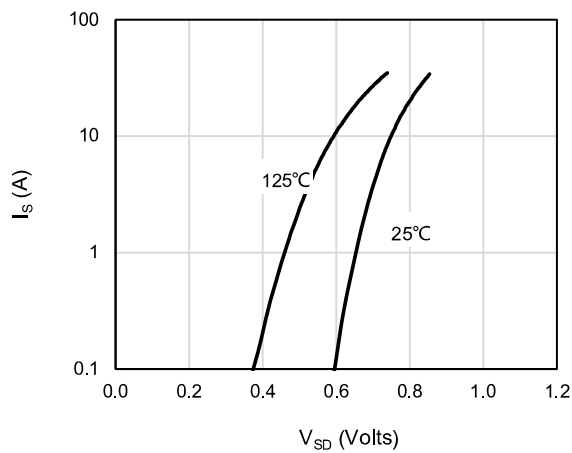


Figure 5: Body-Diode Characteristics

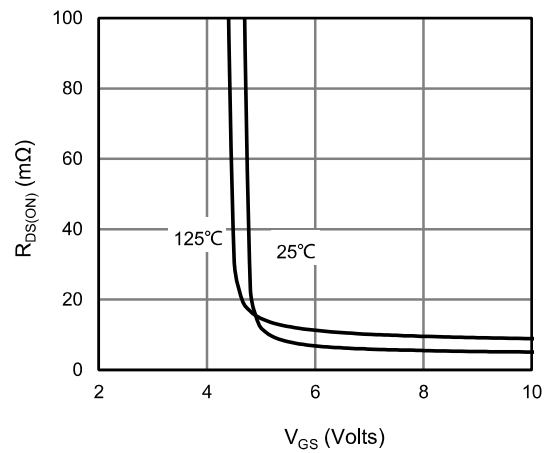


Figure 6: On-Resistance vs. Gate-Source Voltage

6. Typical Characteristics (cont.)

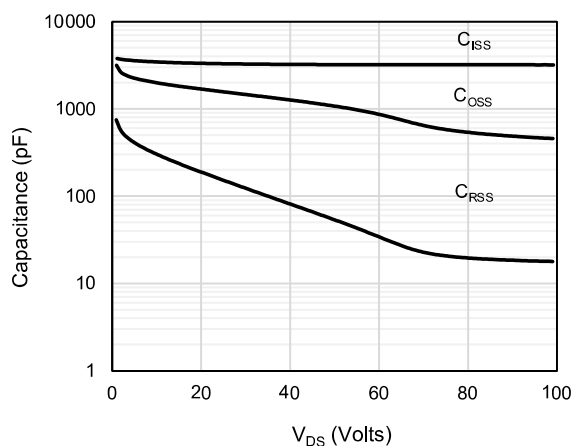


Figure 7: Capacitance Characteristics

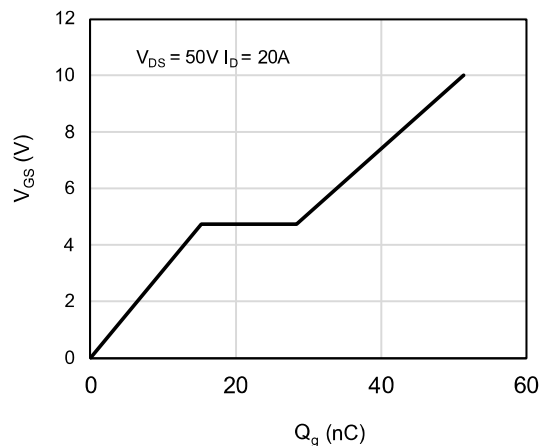


Figure 8: Gate-Charge Characteristics

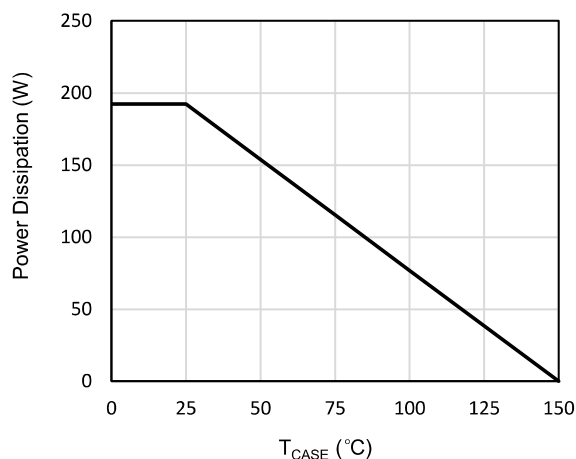


Figure 9: Power De-rating

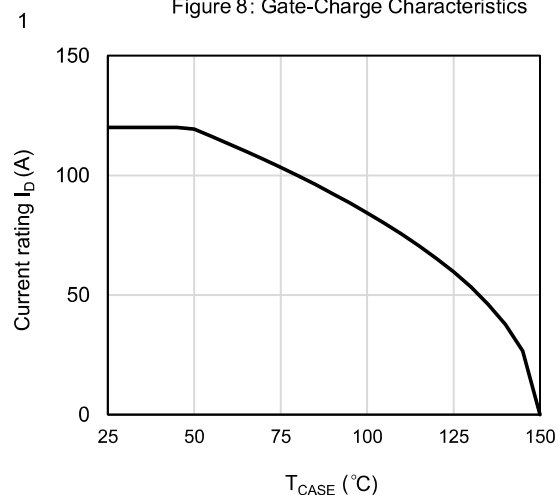


Figure 10: Current De-rating

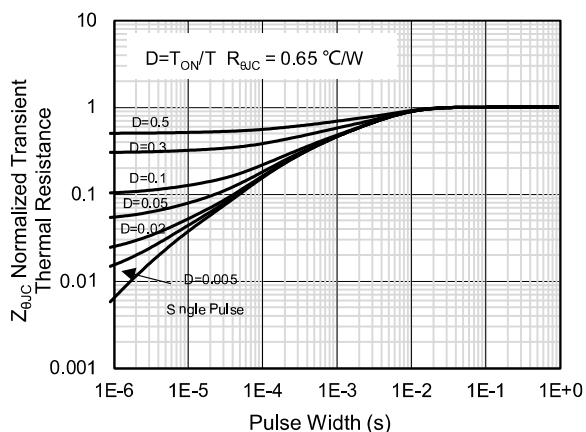


Figure 11: Normalized Maximum Transient Thermal Impedance

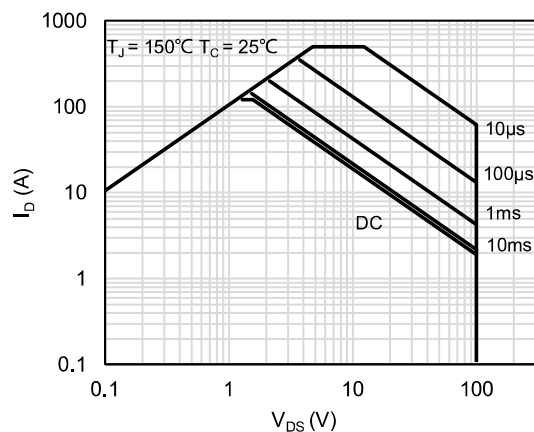
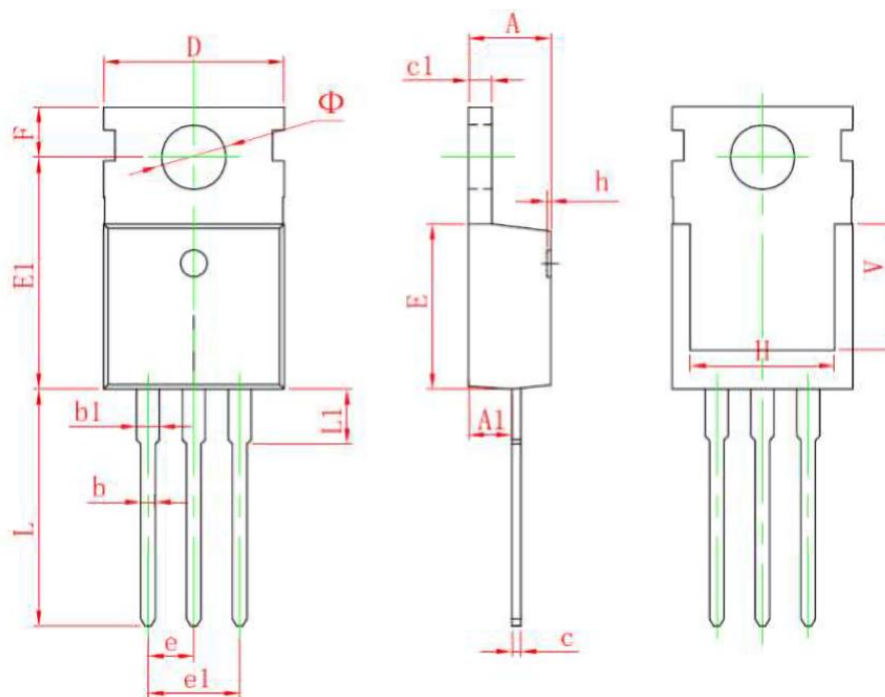


Figure 12: Maximum Forward Biased Safe Operating Area

7. Package Dimensions

TO-220 Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150